

TUBERCULAR CEREBRO-SPINAL MENINGITIS.*

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In the year 1768, Dr. Robert Whyt, of Edinburgh, in a small brochure, described the most common form of acute hydrocephalus, directing attention to the connection between acute inflammation of the meninges of the brain and dropsy of the ventricles. ("Observations on the Dropsy in the Brain," 8vo, Edin., 1768.) About half a century later, French anatomists showed that in the majority of the cases of Whyt's disease, the membranes of the brain themselves are the seat of tubercular deposit. ("West on the Diseases of Infancy and Childhood.") In the year 1825, Marshall Hall described the hydrocephaloid disease. Soon to his accurate observations were added those of Gooch and Abercrombie. In this disease, which is also called by Watson spurious hydrocephalus, no inflammation is supposed to exist, although more or less effusion is found in the ventricles. Fine granulations on the cerebral meninges, often unattended by inflammation appreciable to the unaided eye, had been observed for a long time, but their exact nature was unknown until the year 1830, when Papavoine showed them to be tubercles. (*Journal Hebdomadaire* for 1830, vol. vi, p. 113, quoted from West.)

The literature on the subject of tubercular cerebro-spinal meningitis is exceedingly meagre, many writers on tubercular meningitis not alluding to it. Dr. Samuel Jones Gee (Reynolds' "System of Medicine," edited by Hartshorne)

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states that he has several times examined the cerebro-spinal opening *in situ*, and has always found the membranes about it perfectly healthy. The spinal subarachnoidean space was distended with fluid, especially around the cauda equina. He never observed any other morbid condition within the spinal canal in persons dead of tubercular meningitis. It must be remembered that he examined the cord in a minority of cases.

About the year 1869, three observers, MM. Magnan, Hayem, and Lionville, published almost simultaneously cases of tubercular cerebro-spinal meningitis, giving as their opinion, that tubercles occurred at the same time in the membranes of the brain and cord. The special signs that they attributed to this disease were: tremblings, contractures, tossing, restlessness, tetanic seizures radiating to the neck and trunk, and temporary paralysis. Their autopsies revealed lesions of the cerebral membranes, and granulations on the surface of the spinal pia mater and on the arachnoid. Once the dura mater was most affected and fibrinous exudation was present. (*Le Progrès Médical* for 1881, Galliaux.)

Flint ("Practice of Medicine," fifth edition, p. 702) says: "Tuberculosis of the pia mater of the spinal cord has been found in many instances, and, probably, is the rule." He, however, does not appear to have met with a case in connection with tubercular meningitis.

Huguenin in his elaborate article on tubercular meningitis (Ziemssen's "Cyclopædia of the Practice of Medicine," vol. xii, p. 505) disposes of this disease in the cord in one short paragraph, as follows: "Our knowledge here is quite fragmentary. It is certain that tubercles are found in the spinal cord in many cases of tuberculosis of the pia, and also that their behavior is the same as in that of the brain. The inflammatory affection of the pia seems to pass down a varying distance within the canal. There are no trustworthy statements as to the changes of tissue in the spinal cord; but without doubt many symptoms would, after a more careful investigation of this subject, appear in an entirely different light from that in which they do now."

In the "Transactions of the Pathological Society of Lon-

don," in vol. ii, Mr. Shaw reports a case of tubercles of the brain, and of the spinal marrow and its membranes. The patient was paraplegic, but conscious to the last. In vol. xxi, of the same transactions, Dr. Walter Moxon reports miliary tubercle of the spinal dura mater occurring in a case of tubercular meningitis. The patient was a girl, æt. seventeen years. Duration of the disease was seventeen days.

In the "St. George's Hospital Report" for 1879, fifty cases of general tuberculosis are analyzed. In a large number of these brain lesions were found, but in only one instance was the spinal cord or its membranes found diseased. It is not stated in how many instances the cord was examined, but that spinal lesions were unsuccessfully sought for in cases of tubercular meningitis appears from the report. The case in which the spinal meninges were involved, occurred in a seven and a half months' child, male, æt. four years, of strumous diathesis and of a consumptive family. The mind was precocious and the skin dry. The disease began with cough; headache after about two weeks, when the cough almost ceased. The duration of the lung trouble was sixty-one days; of the head about forty-seven. Tubercles were found in lungs, pleura, and spleen(?); on the meninges of the brain and arachnoid of cord; and a nodule was seen on the under surface of the cerebellum.

H. Rendu (*Recherches Cliniques et Anatomiques sur les Paralysies liées à la Méningite Tuberculeuse*, "Thèse de Paris," 1873), Landouzy (*Contribution à l'Etude des Convulsions et Paralysies liées aux Méningo-encephalites Fronto-pariétales*, "Thèse de Paris," 1876), and Chateaufort (*Contribution à l'Etude de la Méningite Spinale Tuberculeuse*, "Thèse inaugurale de Paris," 1878, No. 384), in the years 1873, 1876, and 1878 respectively, added contributions to our knowledge of the subject of tubercular cerebro-spinal meningitis. (*L'Union Médicale* for 1879, Debove.)

Debove (*Le Progrès Médical* for 1879) reported a case of tubercular cerebro-spinal meningitis. The patient was a man, æt. 29, suffering from pulmonary phthisis. He suffered from severe lumbar pains and unsteadiness of gait for about two and a half months; paralysis of left leg and inability to

void his urine, three days; paralysis of both legs, insensibility of the left and partial insensibility of the right, two days. Delirium was present for the first time about twelve hours before death.

At the autopsy tubercular granulations were found on all the membranes of the cord, most abundant on the pia mater near the anterior and posterior fissures of the cord. Congestion was intense in the lumbar region, and suppurative meningitis was most marked posteriorly in the dorsal. Tubercles were sparse and congestion slight in the cervical region. In the brain a few tubercular granulations were seen along the fissures of Sylvius, with little congestion of the meninges, without a trace of suppuration or fibrinous exudation. The cerebral substance was normal, and the ventricles did not contain an abnormal quantity of fluid.

Dr. Debove calls attention to the following facts in connection with his interesting case: First, the primary lesion was in the spine, the brain becoming secondarily affected, the reverse of what usually takes place. Second, the principal phenomena during life were due to the spinal rather than the cerebral lesion. In the first report of this case, he called it tubercular cerebro-spinal meningitis; in his second, before the same society, a few months later, tubercular spinal meningitis.

Galliaux (*Le Progrès Médical* for 1881), after referring to the observations and conclusions of MM. Magnan, Hayem, and Lionville, gives a short account of a case of tubercular cerebro-spinal meningitis coming under his care. The patient was a man, and like that of Debove's was twenty-nine years old. He was brought to the hospital in a semi-conscious condition two days before his death. His wife stated that he had suffered from cough six weeks, and a few days before being brought to the hospital the cough ceased, and at the same time he began to suffer from fever, diarrhoea, and epistaxis, symptoms which his medical attendant had attributed to typhoid fever. Galliaux detected well advanced tuberculosis of the lungs. The autopsy revealed, in thorax and abdomen, tubercular infiltration of the lungs with small cavities at the apices, pleuritic adhesions, extensive ulcerations in the

intestines; in the brain, a normal dura mater, a pia mater presenting adhesions to the brain substance, most marked around the tuber cinerium, and on the internal surface fine tubercular granulations, most abundant in the fissures of Sylvius. No pus nor free fibrinous exudation was found. The meninges were not thickened or much congested, presenting nearly their normal transparency. Some serous fluid was around the tuber, and a similar fluid filled the lateral ventricles. The cerebral substance was soft, but presented no appreciable lesions; in the spinal canal, the dura mater was adherent to the visceral layer of the arachnoid, its blood-vessels were injected, evidences of slight inflammation were present, and fine tubercular granulations were found on its internal surface.

L. Dubar's (*Méningite Cérébro-spinale Tuberculeuse*, "Bull. Soc. Anat. de Par.," 1879, 4 s., iv, 240-243) contribution to the subject I was not able to obtain, nor were the results of the investigation of Von-Azary accessible. (Von-Azary, A.: *Beiträge zur Tuberkulose des centralen Nerven-systems der Schweine*, "Deutsche Ztsche. f. Thiermed.," Leipz., 1880, vi, 254-269.)

As the following case presents many features in striking contrast to the phenomena exhibited by those already reported, I venture to record it, with as concise history as possible, containing numerous general and surface temperature observations, in the *Transactions* of the College.

H. J., æt. sixteen months, was moderately well nourished but excitable. A superficial suppurating gland had existed on the anterior portion of the neck since the early months of infancy. The father, about thirty-five years old, a German, has a strong and sturdy constitution, and gives an exceptionally good family history. The mother, also of German parentage, is thin, anæmic, and painfully nervous. So far as she knows, her ancestors were free from phthisis and scrofula; her father and mother, about seventy years of age each, are living and well. Some of her brothers died from pulmonary consumption, apparently induced by exposure and dissipated habits.

When about ten months old, the child had an irritative fever, apparently from teething, lasting four or five days. During the

morning of April 15, 1882, about six months after suffering from the fever, it was apparently well, and spent a portion of the time in playing about the yard, but late in the afternoon it became feverish, fretful, and refused to eat. The symptoms grew worse, and I was called at noon the next day. I found undoubted evidences of alarming illness attended by great prostration. Ten or fifteen dark blotches of extravasated blood were seen on various portions of the body; the head was somewhat retracted, and the eyes were turning from side to side; temp., 103° ; pulse, 150; resp., 84. The central incisor teeth only were erupted, but the gums covering the lateral incisors were swollen and painful. These were freely lanced, and the child placed in a hot bath and given potassium bromide. Grave brain trouble was suspected. At 4 P.M., pulse, 180; resp., 96. A violent tetanic convulsion with occasional clonic movements took place during the examination. The face was extremely pale and the child thought to be dying. The convulsive seizure lasted in its worst form about one hour, during which time the little patient lay immersed in hot water. After the fit passed off, the left arm and leg remained rigid, the hand being shut and the foot extended until 4 A.M. the next day. The first evening of my attendance the temperature fell to 102.6° ; the pulse varied from 160 to 180, and respiration from 90 to 96. The hemorrhagic extravasations under the skin disappeared when the body was immersed in warm water. Beginning on the morning of the 17th with temperature of 101.5° , pulse of 160, and respiration of 84 per minute, the symptoms gradually ameliorated during that and most of the two succeeding days.

April 19th.—Morning, temp., 100° ; pulse, 118; resp., 50. It was still restless, refused to eat, cried and moaned most of the time, and slept in short naps only. 8 P.M., temp., 103.8° ; pulse, 135; resp., 84. The change was sudden, the child apparently being much worse. A cough beginning about that time was the only evidence of chest trouble. Twenty-four hours later the resonance of the apex of the left lung was noticed to be much impaired, but no râles could be detected. On the 20th the child slept a good portion of the time. From the 20th to 24th it took but little nourishment, vomited large quantities of phlegm; and incessant cough attended by large mucous bronchial râles, heard all over the chest, kept the little patient fretting. The temperature ranged from 101.8° to 103.5° ; pulse from 112 to 140; respiration from 40 to 60.

24th.—11 A.M., temp., 98° ; pulse, 120; resp., 48. 6 P.M., temp., 105° ; pulse, 130; resp., 60. From the 24th to the 29th the daily

range of temperature was from 98° to 100° – 103° , the rise being as often during the morning as the afternoon hours. The pulse varied from 130 to 140, and respiration from 68 to 70. On the 29th, when Cheyne-Stokes respiration was present, the temperature did not descend below 101° , and reached 102° at 6 P.M. In the evening, Dr. Charles K. Mills saw the case with me, and we agreed that it was probably tubercular meningitis of an irregular type, although the peculiarity of some of the symptoms made us doubtful as to the accuracy of the diagnosis.

On the 30th the morning temperature was 98° ; pulse, 116; resp., 50; evening, temp., 104° ; pulse, 170; resp., 70. The pupils were still small, the head was again retracted, and the child kept up a pitiful moan. During the afternoon, Dr. T. G. Morton met me in consultation. He thought it was a case of tubercular meningitis. Every effort was made to keep the child nourished. In the way of medication it was given the potassium iodide and bromide, and small doses of calomel, or corrosive sublimate. When the bromide failed to relieve, twenty drops of the camphorated tincture of opium were administered every hour until quiet was produced. Cold was occasionally applied to the head, and mustard, from time to time, to the nape of the neck.

May.—During the month highest axillary temperature was found on the 11th, in the morning, when the thermometer registered 105.5° ; the lowest was taken on the 1st, also in the morning, and was 95.6° . The exacerbations of fever were very irregular. On a few occasions during the month, the temperature rose to 103° to 105° , and descended to normal or below the same day; but the febrile paroxysms, however, extended over a period of twenty-four to thirty-six hours, and the lull, during which the temperature was normal or subnormal, lasted from twelve to twenty-four hours. Twice the period of heightened temperature with remissions lasted six days (from the 6th to the 11th, and the 26th to the 31st, inclusive). Only once (on the 15th, 16th, and 17th) did the temperature remain normal or below a period of three days. Throughout the month, the fever had marked remissions which were always attended by free perspiration, simulating, in this respect, malarial remittent fever. The pulse and respiration were frequent, being most rapid, as a rule, when the temperature was highest. The pulse range was from 116 to 180 per minute, being 170 on one occasion, when the temperature was only 96.5° , and frequently having a rate of 150 to 160 with a normal or subnormal temperature. The frequency of the respiration varied from 36 to 86 per

minute, the average being about 60. Those interested in a complete record of the temperature, pulse, and respiration, are referred to the tabular view of this case.

The posterior muscles of the neck were quite firmly contracted on the 5th, and remained so nearly two days. From the 1st to the 8th, the child was very restless, and required repeated doses of camphorated tincture of opium. On the 9th, it became more quiet, but semi-choreic movements of the muscles of the neck, face, and upper extremities, when it was awake, were noticed. Those movements at that time lasted parts of two days only. During the entire day, on the 11th, the child was drowsy, and could scarcely be awakened, although it had taken nothing to induce sleep the previous two days. It would drink, however, when milk was poured into its mouth. From April 16th, to May 11th, the pupils had been rather small, and often very much contracted, but subsequently to the latter date they were noticed to dilate, sometimes to their full extent, just before and during a paroxysm of head-pain. On the 14th, cough, which had been absent nearly two weeks, returned, and was more annoying than during the first attack of pulmonary trouble. Numerous subcrepitant râles, most abundant in the upper portion, were heard in the left lung. On the 14th, seven and a half grains of quinia were given in divided doses. In this daily quantity it was continued for a period of two months, with the exception of two or three days, when it was temporarily suspended. From the 13th to the 31st, the child was very restless, keeping up an almost constant cry, and apparently suffering great pain. Opium was the only thing found to give relief. On the 18th the choreic-like movements returned and continued a day or two. On the 19th, about the time that the lateral incisor teeth were erupted, the left ear began to discharge considerable non-offensive pus. The next day eight twenty-drop doses of camphorated tincture of opium were given, at hour intervals, before rest was obtained. On the 22d, when the muscles of the back and right side of the neck were contracted, ten thirty-drop doses of the same were given at equally short intervals; and on the 23d, fourteen and a half drachms, or nearly two ounces, of this preparation of opium were administered without entirely quieting the child. The discharge from the left ear, still yellow, was thinner and more offensive. It soon became exceedingly unpleasant; by the last of the month the ear ceased to discharge. Instead of the camphorated tincture of opium, morphia was subsequently employed, and gradually increased; the quantity within two weeks necessary

to quiet the child during some of the nights, being two and a half grains. During the afternoon of the 31st, the little fellow was bright, free from pain, and quite playful.

June and July.—The temperature during those months ran a less variable course, reaching 104.1° only once (June 9th), and never descending more than a degree and a half below the normal. The average temperature for the two months was about 99° . The pulse range was greater, the frequency being 180 on a few occasions, and once (July 8th) as low as 86 per minute. When the pulse was slow it became intermittent.

June 5th.—The head was again retracted, large doses of morphia being necessary to afford relief. About that time the child became very passionate, screaming, and striking at every one (except its mother) who came near it. It was conscious and rational, and would promptly answer in the affirmative when asked if it wished to be taken out in its coach.

8th.—The left ear was again discharging non-offensive, thick, yellow pus. A diffuse bronchitis with numerous mucous râles, causing great oppression in breathing, set in about that time and lasted three or four days.

On the evening of the 11th of June, with widely dilated pupils, the child began to scream, and continued to cry vigorously, manifesting other expressions of pain, four or five hours, notwithstanding four doses of one third of a grain of morphia each were administered at short intervals. The next morning it seemed to be free from pain, but was not sleeping continuously.

14th.—Both ears were discharging quantities of yellow non-offensive pus. No teeth were about to be erupted, the gums not being swollen. From the 1st to the 14th of June, the little sufferer, when not under the influence of morphia, was almost constantly screaming.

About the middle of June, it became quiet and ceased to cry except when disturbed. During the latter half of June, and the entire month of July, no anodyne was required. When the administration of large quantities of morphia were necessary the axillary temperature was only exceptionally above 99° .

19th.—A diarrhoea began and lasted a few days, the food passing through the bowels undigested.

July 1st.—I began to register the surface temperature of the head, not having ventured before because I feared the irritability and restlessness of the child would endanger the safety of the thermometers (two thermometers always being used at the same time).

On the 8th, the pulse was slow and intermittent, the stomach irritable, and the bowels loose. It was noted that the child was decidedly worse every second day, being feverish some time during the twenty-four hours on alternate days. The fever always passed off by free perspiration. During the month the little patient seemed to improve, and it was taken into the open air every clear day, and sometimes into Fairmount Park during the early morning hours.

August.—From the 1st to the 15th, the child was quiet, and did not fret when left undisturbed, the temperature ranging from 97.5° to 99.5° .

On the afternoon of the 16th, it suddenly became convulsed, was rigid, and remained in this condition about ten minutes.

18th.—There was some twitching of the muscles of the extremities, especially of the hands and feet. The breathing was the Cheyne-Stokes variety. One forty-eighth of a grain of morphia was required to relieve pain, it being the first day that an anodyne had been necessary since June 1st, a little more than two months. Increasing quantities of morphia were required almost daily the remainder of the month, the child being feverish and restless every afternoon, and frequently screaming violently from head-pain. The range of temperature for the last eight or ten days of the month was from 100° to 102.5° .

On the 25th, 26th, and 27th, Cheyne-Stokes respiration, minus the intermission, was present; and on the 28th, typical Cheyne-Stokes breathing lasting one day only.

September.—My notes of the case for the 1st, 2d, and as late as 4 P.M. of the 3d instant, show a normal axillary temperature, and fairly good pulse and respiration, but the surface temperatures of the head at the 4 P.M. examination of the 3d were 1° higher than the axillary. After having been comparatively quiet for nearly two months, and resting well during the previous two days, it began to cry with apparent head-pain. The pupils were widely dilated. It screamed furiously, and almost immediately, while the thermometers were still on the head, became convulsed. At first every muscle appeared to be rigid, the posterior muscles of the neck and those of the back being most contracted, and producing an extreme condition of opisthotonus. The eyes rolled from side to side, and a few spasmodic movements of the muscles of the body took place. The spasmodic seizure lasted about half an hour, but the leg muscles remained rigid much longer. Respirations were 68 and the pulse 130. At 9 A.M. the next day it

had another convulsion, which soon passed off, leaving a number of muscles contracted. At 10 A.M., I found the muscles of the back of the neck, and the flexors of the legs and arms, and the extensors of the feet, firmly contracted. Twitching of the facial muscles took place occasionally, each spasmodic contraction of these muscles being attended by a scream from the child indicative of great suffering. Temp., 103.5° ; pulse, 148; resp., 16. The head temperatures were a half degree below the axillary. The axillary and head temperatures continued to rise until the former reached 104° and the latter 103.5° . The condition of the muscles remained nearly the same during the day, except those connected with the eyeballs, which became more affected, and kept up a continuous nystagmus. The respirations became very slow and irregular, the pause often being from ten to fifteen seconds in length. 10 P.M., temp., 103.5° ; pulse, 140; resp., 8. Numerous bronchial râles were heard throughout the chest. During the next two days the temperature varied from 102.5° to 103° ; pulse from 140 to 150, and respiration from 28 to 34. The spasmodic movements of the facial muscles ceased, the back muscles of the neck and the flexors of the arms relaxed, but the adductors of the legs and the extensors of the feet remained contracted, and so continued gradually increasing until the death of the child, nearly three months later. The following week the temperature ranged from 97° to 100.5° , the average being about 99° . The axillary temperature was frequently lower than the surface temperatures of the head. The breathing was of the Cheyne-Stokes variety once or twice, and on a few occasions it was slow and irregular. The head was retracted about one half the time, that condition always being associated with symptoms of pain, irritability, and heightened general and surface temperatures. Small doses of morphia (one fourth to one eighth of a grain) were sufficient to quiet the child.

13th.—10 A.M., temp., 93.8° ; pulse, 96; resp., 14. The head temperatures were about 5° higher than the axillary. After that date, to maintain the body heat, it was necessary to have bottles filled with hot water, and to keep them constantly applied to the extremities. The remainder of the month the temperature did not descend below 95° . The deformity of the legs and feet became more marked. The legs were forcibly crossed near the body, and the feet were extremely inverted and extended. A straight line drawn from the anterior surface of the knee to the upper surface of the tarso-phalangeal joint of the great toe passed

through the instep, and one drawn from the popliteal space to the under surface of the same joint of the toe just touched the under surface of the heel. The child was peevish and fretful most of the time. An afternoon rise of temperature was the rule.

On the 28th, the biceps muscle of the right arm was noticed to be contracted. The next day it was more flexed, and the pulse was intermittent. The head became so much retracted about the latter part of the month that deglutition was very difficult. To relieve that condition an issue was established by means of Vienna paste over the upper portion of the cervical spine. After this the head was rarely retracted, and then only to a slight degree.

October.—The general condition of the child continued about the same, the right arm still being flexed. On the 6th, the left arm was first noticed to be affected, the flexor muscles of the forearm being contracted, and the hand deflected to the ulnar side. From that date the arm, like the leg muscles, continued to become more firmly contracted. The right arm was drawn in front of the chest and firmly held against it, the forearm being flexed so that the closed fist was under the chin, making it necessary to cover the hand with cotton to prevent its interfering with respiration and deglutition. The biceps muscle of the left arm was never firmly contracted, the flexors of the left forearm being mainly affected. The left hand was forcibly flexed upon the forearm, and turned to the ulnar side, the finger-nails striking the first phalanx of the thumb. The palm of each hand was padded with cotton to prevent injury by the nails. During the month the axillary temperature varied from 98° to 101.2° , the average being nearly 100° . The head temperatures were a little lower than the axillary. On the 10th, both eyes were turned to the left, and occasionally moved spasmodically downward and far over toward the left side. The eyes remained deflected toward this side, but at times they were nearly straight. Spasmodic movements of the eyes in various directions were noticed when the child suffered much pain. More or less morphia, sometimes a grain in the twenty-four hours, was required the greater portion of the time. From the 18th to the 29th, respiration was of the Cheyne-Stokes variety, the child being restless and suffering pain most of the time. Occasional spasmodic twitchings of various muscles of the body were noticed, those of the face and arms being most affected. The clonic, spasmodic movements seemed to be caused by increased cerebral irritation, and were almost invariably followed by screams from the little sufferer. At those times the permanent contractures were

worse. On the 24th, two grains of morphia were given before pain was relieved. The child had been noticed to stare meaninglessly for several days, but it was not found to be entirely blind until the 29th. At that time an ophthalmoscopic examination of the fundus of each eye showed both optic discs to be very white, and apparently slightly swollen.

November.—The first twenty days of the month the child was comparatively quiet, ate well, seemed to gain some flesh, and was generally quiet without morphia. During that period it was most irritable the 3d and 11th, but it did not have much rise of temperature on those days. The child was worse every second day.

21st and 22d.—There were numerous bronchial râles, but no fever, the breathing seeming to be a little more labored than usual.

23d.—Temp., 98° ; pulse, 108; resp., 28. Large bronchial and subcrepitant râles abundant.

24th.—10 A.M., temp., 96.7° ; pulse, 130; resp., 40. 6 P.M., temp., 99.6° ; pulse, 140; resp., 52. Impaired resonance posteriorly; crepitant and subcrepitant râles were observed.

25th.—10 A.M., temp., 101° ; pulse, 160; resp., 80. Marked dulness was found over the lower portion of both lungs posteriorly. The child took no notice of any thing, but swallowed when liquid food was placed in the mouth. 6 P.M., temp., 101.5° ; pulse, 165; resp., 92. The respiration was ascending and descending, but no intermissions, as in the Cheyne-Stokes type, occurred.

26th.—It died at 2 A.M., being able to swallow five minutes before death; no convulsions occurred. The breathing became very slow a short time before life was extinct.

Section cadaveris was made twelve hours after death by Drs. C. K. Mills, I. E. Roberts, and myself.

Rigor mortis was just beginning; skin was rough, wrinkled, and very thin. There was great emaciation, the subcutaneous fat having been entirely absorbed. When the child was one year old it weighed twenty-five pounds, but after death, the age being about two years, its weight was only eleven pounds, although its height was probably greater than that of most children of the same age.

Head.—Circumference, twenty inches; transverse arch (from mastoid to mastoid), fourteen inches; right half of arch to sagittal suture, six and seven-eighths inches; left half, seven and one-eighth inches. The head did not seem greatly enlarged. All the

bony sutures had closed externally except at the junction of the coronal and sagittal. The skull-cap was so thin and yielding, bending like bonnet-board before the saw, that much care had to be exercised in its removal to prevent injuring the brain or its soft coverings. The dura mater was not more adherent to the bone than is usual in children of one or two years of age, except along the line of the sagittal suture, where it became necessary to sever its connections with the bone by the use of considerable force, aided by the knife. After the skull-cap was removed, all the sutures were found to be closed internally. The internal surface of the bony cap was smooth, the bones being very transparent, and measuring in the temporal regions from one fortieth to one thirty-secondth of an inch in thickness, and in other situations from one twelfth to one eighth of an inch. The dura mater was thin and pale, and its sinuses were nearly empty, containing no clots, and but little blood. The pia mater on the convexity of the brain was so attenuated and transparent that it was difficult to distinguish its presence. The various fissures, primary and secondary, could be traced without removing this membrane. The pia mater over the orbital surfaces of the frontal, the basal surfaces of the temporal and occipital lobes, presented the same attenuated, transparent appearance seen on the convexity. The membrane covering the anterior and posterior subarachnoidian spaces on first exposure seemed to be opaque, but on cutting it a serous fluid escaped, leaving it of the usual appearance. A few millimetres to the left of the optic chiasm, two yellowish-white spots, about one eighth of an inch in their greatest dimensions, were seen in the substance of the pia mater.

The convex surfaces of both hemispheres of the brain on palpation gave decided fluctuation. On cutting into the lateral ventricles, they were found filled with a colorless watery fluid. The bodies and horns of these ventricles were enormously dilated. The foramen of Monro, the third and fourth ventricles, and the Sylvian aqueduct were enlarged to about two or three times their normal dimensions. On examining the walls of the lateral ventricles and their much dilated horns, prominent veins could be seen everywhere forming beautiful arborescent appearances. The veins of the intra-ventricular striate bodies, the veins of the choroid plexuses, and the veins of Galen themselves, were enlarged and prominent. The ventricular fluid measured fifteen ounces. Measuring from the anterior extremity of the anterior horn to the posterior extremity of the posterior horn, the greatest length of

each lateral ventricle was six and a quarter inches. Both ventricles appeared to be dilated equally. The thickness of the brain substance constituting the walls of the lateral ventricles was measured at several points. It was thinnest in the region bounding the dilated posterior horn, within and below, where it measured about one sixth of an inch. Sections through the gray and white matters showed no punctæ vasculosæ, the brain-substance throughout being markedly bloodless. It was firm and cut cleanly, not adhering to the knife.

The cervical and upper dorsal portions of the spinal cord and its membranes presented nothing abnormal on macroscopic examination.

Thorax.—No pleuritic adhesions or effusions. The smaller bronchial tubes were nearly filled with muco-pus. The lower and posterior portions of the lungs were œdematous and congested. The apices of the lungs were firmer than normal, and in the right apex a small cicatrix and several little nodules. The heart was very small but apparently normal. The abdominal organs were not examined.

Parts of the brain and the cervical portion of the spinal cord and their membranes, and a small piece of the apex of the right lung, were properly hardened and sent to Dr. L. Brewer Hall, a practical microscopist, for examination. The results of his examinations he gives as follows :

“Sections of the spinal cord and membranes show oval masses of rounded cells along the vessels of the dura mater, lying chiefly outside their walls. In some places the coats of the vessels are thickened ; the nervous tissue appears normal. Similar appearances are occasionally seen in the membranes of the brain ; many sections, however, show nothing abnormal. In the apex of the lung there are minute inflammatory spots, visible in some of the sections only. Parts of these consist of rounded cells about and within a bronchus, but others are surrounding blood-vessels and not encroaching upon their calibres.

“The pathological condition is tubercle, chiefly of the membranes of the spinal cord, less abundant in the meninges of the brain, and rare and small, though present, in the lung.”

In the history of the case which I have given in detail to-night, periodicity of temperature, attended by numerous exaggerated symptoms of brain disturbance, was well marked.

During these periods, in which the case ran a less acute course, a slight exacerbation of fever was noticed nearly every alternate day. After the first few weeks of the disease, when the fever began to reach its highest points, the paroxysms of fever, headache, and restlessness varied from a few hours to one or two days. The fever invariably passed off by a free perspiration. On some days the fever was of the remittent type, and on others, of the intermittent. I have frequently observed a striking similarity between the temperature variations of malarial fevers and those due to brain diseases; but in no instance have I seen the temperature of the latter diseases resemble that of the former when the membranes or cortical substance of the brain was uninvolvement by disease. Fevers of cerebral origin differ from those of malarial poisoning, in that the paroxysms of the former are less regular in their occurrence and duration, and are not so easily prevented by large doses of quinine; although in the case reported in this paper, large daily quantities of quinine seemed to prevent excessive rise of temperature, and apparently lessened the frequency of the paroxysms.

During the first few days of the child's sickness, the diagnosis was between spurious hydrocephalus, acute meningitis, tubercular meningitis, and sporadic cerebro-spinal meningitis; later, between the last two and chronic hydrocephalus. A careful study of the morbid anatomy of this case, however, discovers no lesion that is not found in one or more of the above diseases, yet the clinical history, when taken in connection with the varying records given by the body and head temperatures, shows the disease to be possessed of a certain individuality, which, with a number of carefully studied histories, we might be able to recognize.

The quantities of morphia, two or three grains in twenty-four hours, which were given to a child less than two years old without producing death, seem almost incredible. At first, twenty drops of camphorated tincture of opium were sufficient to quiet the child for a short time, but this preparation of opium was gradually increased until about

two ounces were necessary for twenty-four hours. In the same way morphia was increased as toleration was established, the maximum quantity only being reached after regularly giving the drug a number of weeks. After having discontinued the use of morphia two months, the return of head-pain compelled me to again resort to it. This time, also, small doses were at first sufficient to quiet the child, but in the course of a few weeks one third to one-half grain doses were required. While large doses of opium were being administered, neither diarrhœa nor vomiting were present.

The extraordinary duration of the tubercular disease of the cerebro-spinal membranes, in this case, extending over a period of nearly eight months, simulated rare cases of sporadic cerebro-spinal meningitis, which may, also, after further investigation, be found to be tubercular in their nature. Ordinary cases of tubercular meningitis run their course in from two to four weeks. A few have lasted about ten weeks. There is, however, on record, one rare case of tuberculosis of the cerebral membranes ("St. George's Hospital Report" for 1879), in which the head symptoms were of twelve months' duration. The patient was a man, thirty-five years old, admitted into the hospital a few hours before his death. The man and his wife stated that the affection had begun suddenly twelve months before, with embarrassment of speech and deglutition. Failure of the sight, with severe cough and wasting, was of six months' date. "On admission, the symptoms were general weakness of the limbs, the arms in particular moving with jerking action, and requiring concentration of thought to influence them at all; loss of power of deglutition, during attempts at which the head was turned around to the right; inability to protrude the tongue; complete anæsthesia of the soft palate; indistinctness of speech, the vocal cords seemingly partially paralyzed; dulness of vision, ptosis, frowning of the forehead, sluggishness of the pupils, and drowsiness; but no derangement of mind." The post-mortem appearances were: "A few tubercles in the arachnoid on the convexity of the brain; a little lymph

in the interpeduncular space, without tubercle; the medulla and its nerves normal; left kidney small." The case I have just quoted, when taken in connection with the one reported in this paper, is particularly interesting on account of its long duration, decided motor disturbance of cerebral origin, and the slight lesion found in the arachnoid of the brain, the spinal cord apparently being uninvolved. The long duration of the case I have reported to-night may, I think, have been due to tubercles being very sparsely scattered on the membranes of the brain and cord, without any other organ becoming sufficiently affected to endanger life.

In cases of tubercular cerebro-spinal meningitis are the paralysis and rigidity of spinal or cerebral origin? H. Rendu (Debove, *Le Progrès Médical* for 1879) says: "I think I am authorized in concluding that the existence of tubercular granulations on the spinal meninges have only a purely anatomical interest, and that their value, in a clinical point of view, has been, perhaps, exaggerated."

In Debove's case (*Ibid.*), the chief symptoms were due to the spinal lesions, which were most marked in the dorsal and lumbar regions. And in the one related by Chateaufort (*Ibid.*), the spinal symptoms were first, and in the forefront. The patient was suffering from advanced pulmonary tuberculosis. A few days before his death he felt a sharp pain in the spine radiating to the lower limbs. Marked rigidity of the trunk was present, and finally delirium and paralysis. In the case of the child attended by me, the lesions of the spinal membranes were greater than those found in the cerebral meninges.

"Rendu (A. McL. Hamilton, "Nervous Diseases," 1881; Review in *Gaz. des Hôpitaux*, Jan. 15, 1873) affirms that whenever there is paralysis of permanent form there must be some obliteration from fibrinous exudation and consequent softening, and he does not believe that scattered granulations or ventricular effusion are alone sufficient for its causation." Ventricular effusion, as seen in chronic hydrocephalus, especially, is not usually attended by rigidity of the muscles of the extremities. The pathological lesions dem-

onstrated by different observers of tuberculosis of the nervous centres abundantly prove that paralysis or contractions of a permanent character may result from lesions in the spinal cord or brain, or in both. In my case there was no paralysis, although a large quantity of fluid filled and distended the ventricles, probably because, as contended for by Rendu, no lesions of softening existed. The rigidity in this case may be accounted for by the comparatively sudden ventricular effusion, which apparently took place, a few months before the child's death; the brain being thus crippled, its inhibitory influence over the cord was lessened, and the latter nerve-centre kept up a constant muscular contraction. What I think is a more plausible explanation of the condition, is found in the presence of scattered tubercle, attended by inflammation, in the membranes of the brain and cord. Tubercles were few in both situations, but most abundant in the membranes of the medulla, the very centre of reflex actions.

The macroscopical appearances of the brain and cord and their membranes were those of great anæmia of the parts. Nothing suggestive of tubercle or even inflammation, save two small yellowish nodules at the left of the optic chiasm, was seen. Many of the microscopical sections, also, showed neither tubercular nor inflammatory lesions. It is evident from a careful study of this case that examinations must be most careful and thorough before giving a negative opinion in regard to the presence or absence of tubercles or of inflammation of the membranes of the brain and cord.

The pulse frequency of the case reported to-night, like that of tubercular meningitis, divides the disease into three unequal stages. The first stage was of five months' duration, during which the pulse was very rapid, being, on the average, about 130 to 135 per minute, but frequently reaching 160 to 170, and on a few occasions 180. The second stage was one month long, the pulse ranging from 76 to 120, the average being about 100. The last stage extended over a period of about one and a half months, the pulse being again rather rapid, from 104 to 148, the average being about

130. During the early part of the disease respiration was most rapid when the pulse was most frequent; but later, slow respiration (8 or 10 per minute) was accompanied by rapid pulse (140 to 144).

Irregularity and sudden changes were well shown by the axillary thermometric records. On May 1st, the temperature fell from 104° to 95.6° , or 8.4° in twelve hours; and three days later, from 105° to 96.5° , or 8.5° in about the same length of time. Diurnal variations of temperature from 4° to 6° were common. The temperatures in each axilla were compared sixty times; in five of these the left axillary heat exceeded the right from $.1^{\circ}$ to 1.8° , the average difference being $.5^{\circ}$; the temperatures were equal eight times, showing the right axilla to have been warmer than the left forty-seven times, the difference varying from $.1^{\circ}$ to 1.8° , the average being only $.3^{\circ}$. Part of the variation, I think, may be accounted for by the difficulty we encounter in keeping children quiet while registering their temperatures.

Cerebral Thermometry.—From my paper which I read before the College, May 3, 1882 (Report of Three Cases of Abscess of the Brain), I quote the following: "Dr. Gray found the average normal temperatures of the stations on the side of the head to be for the frontal $.65^{\circ}$ F., for the parietal $.86^{\circ}$ F., for the occipital $.72^{\circ}$ F., higher than those of the corresponding stations on the right side. He gave as the average normal temperature of the right frontal station 93.71° F., of the left 94.36° F.; of the right parietal 93.59° F., of the left 94.44° F.; of the right occipital 91.94° F., of the left 92.66° F. Variations of more than 1.5° he considered suspicious of disease at that point, and of more than 2° strong evidence of a pathological condition."

Dr. J. S. Lombard published in book form, in 1879, the results of upward of 60,000 observations on the regional temperature of the head made by means of the thermoelectric apparatus. ("Experimental Researches on the Regional Temperature of the Head," etc., by J. S. Lombard, M.D.) His averages of temperatures of the different regions of the head are:—

Average Temperature.

	Anterior region.	Middle region.	Posterior region.
Right side,	92.942° F.	92.073° F.	92.343° F.
Left side,	92.825	92.114	92.267
Both sides,	92.883	92.093	92.309

He says that "higher values, especially for the anterior, are more frequently met with in ordinary examinations; but it is extremely difficult to arrive at satisfactory conclusions as to average absolute temperature from observations made upon individuals while engaged in the ordinary avocations of life, the results thus obtained being very variable. Under such circumstances, a temperature of 95.36° F. for the anterior region; one of 94.1° F. for the middle region; and one of 93.56° F. for the posterior region, would probably represent more correctly, in the majority of cases, the highest absolute temperatures."

It will be seen by Lombard's conclusions that the temperatures of the anterior and posterior regions are higher, and that of the middle region lower on the right than on the left side of the head. In a later work by the same author ("Experimental Researches on some Points Relating to the Normal Temperature of the Head," by J. S. Lombard, M.D., 1880), it is stated that: "It was found in these experiments, among the results, that every one of the small divisions of the surface of the head might be hotter on the right side or on the left side in turn, and also that many of them showed at times equality of temperature of the two sides."

In numerous observations made by myself on cerebral temperature of persons in health, and of persons suffering from general febrile conditions, the right side of the head has been found, in many instances, slightly warmer than the left. When surface thermometers are employed to register the heat of the head in disease, I think, if we take the "highest absolute average temperatures" of Lombard for comparison, we shall be less likely to come to erroneous conclusions. If we take, then, the comparatively high temperatures, 95.36° F., 94.1° F., and 93.56° F., for the normal heat of the anterior, middle, and posterior regions of the head

respectively, we shall find, when we compare them with the results of the numerous temperature observations made on the patient whose case is reported in this paper, that much of interest, and, probably, of clinical value, may be derived by a careful study of cerebral thermometry in these cases.

The results of the local thermometric records in this case may be thus summed up :—

The surface temperatures of the head and of the upper posterior cervical region were registered on ninety-seven different occasions, during which four hundred and eleven surface-temperature observations were made on these parts. The cerebral temperatures exceeded the axillary forty-six times; that of the axilla was higher than the head temperatures forty-seven times; and the temperatures of the head and axilla were equal four times.

Once the temperatures in the axilla and over the upper cervical region were equal; four times the temperature of the latter region fell below that of the axilla, varying from $.1^{\circ}$ to 1° ; twenty-four times the heat of the upper cervical region exceeded that of the axilla, it having been on one occasion as much as 3.4° above it. The temperature in the upper cervical region was usually greater than that of the head, it having been higher nineteen times out of twenty-nine.

Of the forty-six times that the head temperature was greater than that of the axillary, the heat of the latter region was subnormal sixteen, normal eleven, and above normal nineteen times. Of the forty-seven times that axillary temperature exceeded that of the head, the thermometer in the axilla registered subnormal seven, normal ten, and above normal thirty times.

The lowest head temperature found was 95.8° , the axillary heat at that time being 97.8° . The highest head temperature registered was 103.5° , the axillary being 104° . The lowest axillary temperature recorded was 93.8° , the cerebral temperature, at the same time, standing at 98° . The highest temperature found in the axilla, at the time of registering the head temperatures, was 104° , the surface thermometer on the head at the same time rose to 103.5 . Once the head

temperature was 4.2° greater than the axillary, but the heat of the axilla never exceeded that of the head more than 2° .

The average temperature of the axilla, of the various regions of the head, and of the upper cervical region, are as follows:—

Parietal station.	Rolandic station.	Posterior frontal station.	Superior frontal station.	Occipital station.
Right side 99.24°	Right side 99.27°	Right side 98.95°	Right side 98.65°	Right side 98.54°
Left " 99.24°	Left " 99.22°	Left " 98.80°	Left " 98.75°	Left " 98.28°

Middle frontal station 98.08° . Middle occipital 98.39° . Upper cervical region 98.41° . (The average temperature of the upper cervical region was slightly above those of the head and axilla, but the table shows a different average, the discrepancy appearing because the temperature was registered a limited number of times over the upper cervical region.) Axillary region 98.89° .

The head temperatures at no time descended to the normal, although the axillary temperature was either normal or subnormal forty-five times out of ninety-seven comparative examinations. The temperatures of each side of the head were nearly equal. Corresponding regions of the two sides rarely varied more than a fraction of a degree Fahr. The parietal stations were the warmest; the middle frontal station, only a little below the middle occipital, was the coolest.

If the results of the cerebral temperature observations of this case are compared with the observations made by Dr. Mary Putnam-Jacobi (*THE JOURNAL OF NERVOUS AND MENTAL DISEASE*, Jan., 1880), on a case of suppurative tubercular meningo-cephalitis, a striking difference in the height of the temperature will be found, partially confirming the conclusions that I had almost arrived at from numerous observations on cerebral thermometry, viz., that brain lesions accompanied by congestion or inflammation are attended by higher head temperature before than after suppuration supervenes.

The following conclusions may be drawn from the contents of the paper:—

1. Tubercles occur in the membranes of the brain and cord, but they are more frequently found in the former than in the latter situation.

2. Tubercular deposit may first take place in the meninges of the cord and then extend to those of the brain, although the reverse is the rule.

3. Tuberculosis of the cord, contrary to the views of Rendu, has more than an anatomical interest.

4. Tubercular cerebro-spinal meningitis gives rise to special symptoms, and by a careful analysis of a number of cases, it may be recognized.

5. It is probable that many cases of so-called sporadic cerebro-spinal meningitis, that have a duration of several months and then prove fatal, are tubercular in character.

6. Paralysis or contractions may be due to brain or spinal lesions, or to both.

7. When cerebral fever simulates the periodic manifestations of malaria, the lesion is probably in the membranes or cortical substance of the brain, or in such a position as to exert pressure upon these structures.

8. Ventricular effusion probably does not give rise to paralysis or contractions; the former motor disturbance in these cases being due to softening of motor zones, and the latter to irritation of the meninges of the brain and cord.

9. Repeated microscopical sections may have to be made in certain cases of tuberculosis of the meninges before the nature of the disease is detected.

10. Right or left side of the head may, in turn, be the warmest in health.

11. When surface thermometers are used to register the cerebral temperature in disease, the normal averages should be taken to be 1° to 1.5° higher than those given by Gray and others.

12. The head temperature in disease of the brain may equal or exceed the heat of the axilla for a length of time.

13. In cerebral lesions, the temperature of the head is not marked by those sudden variations manifested by the axillary temperature in these cases.

14. Variations of head temperature in diseases of the brain take place comparatively slowly. The tendency of the heat of the head to remain permanently above the normal, while that of the axilla is normal or several degrees below, is the strongest evidence of organic disease.

15. The thermometer and the microscope in the case reported agreed in locating the greatest inflammatory trouble in the upper cervical portion of the cord.

16. Brain lesions attended by congestion or inflammation have a higher local temperature than suppuration going on within the cranial cavity.

[After the reading of the preceding paper:—]

Dr. ROBERTS BARTHOLOW said: Since you have called on me, Mr. President, I will make some remarks on the very elaborate report which we have just heard. The impression which the clinical history makes on me is that the case if tubercular is one rather of general tuberculosis than of tubercular cerebro-spinal meningitis. It may be objected to this view that in every case of tubercular meningitis there is more or less generalized tubercular deposit. It seems to me, however, hardly logical to place so much emphasis on the spinal affection. In most cases of unquestionable tubercular meningitis the principal seat of tubercular deposit is at the base, hence the term *basilar meningitis*, parts in immediate connection with the spinal meninges. It is the more philosophical, therefore, it seems to me, to regard such cases as examples of general tuberculosis; now one set of organs, now another set, being the points selected for a special tubercular deposit. I do not, therefore, believe in the existence of any cases of tubercular cerebral meningitis, or spinal meningitis, *per se*, but in a general tuberculosis, with special implication of certain organs. Under such circumstances the symptomatology will vary with the particular functions of organs the most involved.

As regards the cerebral thermometry on which the essayist has much dilated, I beg to say a word or two. Up to the present, cerebral-temperature changes have not afforded us much information. As you are well aware, Mr. President, Lombard achieved but trifling results in his study of cerebral temperatures, although he employed the most elaborate instruments of precision now available for the purpose. Indeed, it is now well understood that the temperature of the scalp affords no certain indication, if any in-

dication whatever, of the cerebral temperature. A few years ago a physician of New York, Dr. Amidon, received a prize, and attracted no little attention, for an essay, in which he attempted to show that certain motor areas in the brain could be mapped out by the temperature changes in the scalp, induced by active exercise of the muscles in anatomical relation with these motor areas. But it was soon ascertained that the temperature changes were limited to the scalp, and that the "willed movements" do not, so far as at present known, so raise the temperature of the motor cortical centres as to change the temperature of the scalp. In fact, it is now known that the temperature of distant parts is influenced by slight excitation of the surface. Thus, Strumpf, of Dusseldorf, has shown that faradic stimulation of the skin of one member affects the heat of another member. There are numerous examples of the same kind. In this way the influence of muscular action on the temperature of the scalp is explained. We cannot, therefore, formulate conclusions in regard to the condition of the brain from observations on the heat of the scalp. The whole subject is still *sub judice*. Hence, I think it is very unsafe to draw conclusions from cerebral thermometry in the present state of our knowledge.

Dr. DA COSTA remarked that, notwithstanding the elaborate and able report of the case, he had some doubts with reference to its character. The sudden beginning was unlike that of tubercular meningitis—rather that of those instances of cerebro-spinal fever which begin acutely and may become chronic. In support of this view there was an eruption of an ecchymotic kind, in the first twenty-four hours, such as occurs in cerebro-spinal fever; there is no eruption in tubercular meningitis. Again, there was no very positive evidence of tubercle in the lung, and he thought it unlikely that a case of tubercular meningitis should have existed for months, affecting the brain and cord, and no decided tubercles in the lungs be found.

Dr. CHAS. K. MILLS referred to the fact that in a number of cases of tubercular meningitis, some in children and some in adults, some general and some localized, he had observed

eruptions differing in character; sometimes erythematous, sometimes vesicular, sometimes ecchymotic, and probably, in the latter case, due to extreme vaso-motor paresis.

He alluded also to four cases of tubercular meningitis seen with Drs. Franklin and Ott. In three of these gross appearances were present; in the fourth the appearances were similar to those exhibited by Dr. Eskridge's patient. No tubercular masses were visible anywhere, either at base or convexity, and yet the microscope revealed miliary tubercles in great abundance. These observations show the importance of not concluding that a case is non-tubercular simply from microscopic examination. Probably many of the statements of the older observers are not to be relied upon in this respect.

Dr. ESKRIDGE, in closing the discussion, said that it was probably exceedingly rare to have tubercular inflammation of the membranes of the brain or cord without tubercles occurring in other portions of the body. In pulmonary tuberculosis it was common for other organs than the lungs to be attacked. He was inclined to think that if, in certain cases, we follow the custom of locating the disease in one or more organs, those should be selected which were most early and prominently affected. In the case under consideration the early symptoms, and, in fact, those of any prominence at all throughout the disease, were due to the cerebro-spinal lesions. The point was well taken by the first speaker, as the microscope shows that most cases of so-called local tuberculosis are examples of general tubercular affections. The same speaker was also justified in questioning the claims that had been made by some observers for cerebral thermometry. Dr. E. was not yet satisfied that surface thermometers would enable us to locate lesions in different portions of the brain with sufficient accuracy for general diagnostic or therapeutic purposes. He desired to call special attention to one point in connection with his observations on the surface temperature of the head in this and other cases, viz., that a sustained high head temperature extending over a considerable period, while the axillary heat was normal or below, pointed to

organic lesion of the brain or its membranes. Again, in brain diseases, the cephalic temperature is less variable than the axillary heat in the same cases. The sudden beginning and long duration of the case the history of which he had given in detail, and the presence in it of an early eruption, was thought by the second speaker to point to sporadic cerebro-spinal meningitis rather than to the tubercular form of meningeal disease. Cases of tubercular meningitis without prodromata were the exception, but they did occur. One or two of the three cases referred to by Dr. Mills, and reported in a joint paper by himself and Dr. Ott (*Philadelphia Medical and Surgical Reporter*, July 3, 1881), were ushered in by convulsions, the previous health of the children having been good. Dr. Gee (Reynolds' "System of Medicine") says "that out of twenty-six cases of primary tubercular meningitis (the diagnosis having been confirmed by a *post-mortem* examination in all) there were only two in which premonitory symptoms had not been noticed." The long duration (nearly eight months) of the present case would class it with the curiosities of medical literature, but it was not without a parallel, for Dr. E. had quoted a case in the early part of his paper, from the "St. George's Hospital Report" for 1879, in which the meningeal symptoms extended over a period of twelve months. Other cases of tubercular meningitis that have lasted about ten weeks have been reported. The eruption referred to in his case, and thought by some to be of considerable diagnostic value in this particular instance, looked like blood extravasated under the skin, but it disappeared as soon as the child was put in a warm bath, an hour or two after he first saw it. It did not again make its appearance.

The absence of macroscopical appearances of inflammation militated, to his mind, very strongly against the supposition of the disease having been sporadic cerebro-spinal inflammation. So far as he knew, if the patient lived a few days after being seized with the last-named disease, inflammatory deposits were always apparent to the unaided eye. If it be argued that the present case lasted so long that the exudate was absorbed, he would like to know the cause of

death. Irritation was increasing, as shown by muscular contractions, etc., during the last two months of the little fellow's illness, yet at the autopsy no visible exudation was present. In rare cases of tubercular meningitis the macroscopical appearances of inflammation have not been well-marked. In one of the cases reported by Drs. Mills and Ott, no tubercles were seen. In one of tubercular cerebro-spinal meningitis reported by Galliaux, the "membranes were not thickened or much congested, presenting nearly their normal appearance." At the autopsy of Dr. Eskridge's case the presence of tubercles was not suspected by Dr. Mills or himself, and inflammation, which, during life, was thought to exist, could not be detected by any exudate. Hardened portions of the brain and cord and their membranes, and of the lung, were given to an expert microscopist who knew nothing of the history of the little patient, and he was asked to decide whether inflammation had existed. He found, as stated in his report, tubercles in portions of all the organs examined. If it were not for the microscopic revelations, which Dr. Eskridge did not feel inclined to dispute, the case he had reported to the College would have to be considered one of chronic cerebro-spinal meningitis minus appreciable exudation.